

DOCUMENTED CHROMOSOME NUMBERS 1996:4. CHROMOSOME NUMBERS OF CAMPANULACEAE. IV. MISCELLANEOUS COUNTS

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ABSTRACT

Gametic chromosome numbers are reported for ten accessions of Campanulaceae, representing six genera and six species, one of which was represented by five cultivars. The chromosome number of *Cyanea hirtella* is reported for the first time; it has $n = 14$, the same as the four congeners previously reported. Within *Lobelia erinus*, a cultivar of the Pendula Group was tetraploid ($n = 14$), while four Compacta Group cultivars were hexaploid ($n = 21$). Previous counts of $n = 14$ in *Clermontia kakeana* and *Hippobroma longiflora*, $n = 16$ in *Campanula isophylla*, and $n = 17$ in *Trachelium coeruleum* were confirmed.

RESUMEN

Se citan los números cromosómicos gaméticos de diez recuentos de Campanulaceae, correspondientes a seis géneros y seis especies, una de las cuales está representada por cinco cultivares. Se recuenta por primera vez el número cromosómico de *Cyanea hirtella*; tiene $n = 14$, el mismo número que los cuatro congéneres previamente contados. En *Lobelia erinus*, un cultivar del grupo Pendula es tetraploide ($n = 14$), mientras que cuatro cultivares del grupo Compacta son hexaploides ($n = 21$). Se confirman los recuentos previos de $n = 14$ en *Clermontia kakeana* y *Hippobroma longiflora*, $n = 16$ en *Campanula isophylla*, y $n = 17$ en *Trachelium coeruleum*.

A comprehensive review and synthesis of data on chromosome numbers in Campanulaceae subfamily Lobelioideae was published recently (Lammers 1993). Since that summary, a few miscellaneous accessions have been counted. A parallel review of numbers in subfamily Campanuloideae is being prepared, and a few miscellaneous counts from that group likewise have accumulated, which require publication before they can be incorporated there. All of these counts are pulled together here and reported.

MATERIALS AND METHODS

The accessions of *Campanula*, *Lobelia*, and *Trachelium* examined in this study were cultivated by the senior author in the Chicago metropolitan area, while the material of *Clermontia*, *Cyanea*, and *Hippobroma* was collected from naturally occurring populations in the Hawaiian Islands. In both cases, flower buds were harvested and immediately fixed in a modi-

fied Carnoy's solution (6 chloroform : 3 ethanol : 1 glacial acetic acid, v/v) for a minimum period of 48 hours. For each sample, a voucher specimen was collected at the same time from plants of the same seed lot (cultivated plants) or from the same individual (naturally occurring plants) as the fixed floral buds. In the laboratory, anthers were excised from the buds and squashed in acetocarmine. Counts were then made from microsporocytes in various stages of meiosis via phase-contrast microscopy.

RESULTS

Chromosome numbers were successfully determined for ten accessions, representing six genera and six species, one of which was represented by five cultivars. These counts are summarized in Table 1.

DISCUSSION

This is the first report of chromosome number for *Cyanea hirtella*, the fifth of the 65 species in that endemic Hawaiian genus to be examined cytologically. All show $n = 14$, interpreted as tetraploid (Lammers 1993; Lammers & Lorence 1993).

African *Lobelia erinus* includes diploid ($n = 7$), tetraploid ($n = 14$), and hexaploid ($n = 21$) plants (Lammers 1993). All three levels have been reported in cultivated material, but only the first two have been found in natural populations. In Mozambique, Thulin (1983) reported a diploid count from coastal plants representing the segregate species *L. lavendulacea* Klotzsch, and a tetraploid count from plants at 1500 m elevation referable to the segregate species *L. senegalensis* A. DC. These are the only counts made from naturally occurring plants. All remaining counts in the literature were made from cultivated material.

Lobelia erinus is the most widely cultivated species of Lobelioideae in the world. Numerous cultivars are available, which may be classified into two groups: Compacta, with short erect stems and a strict habit, suitable for bedding and edging; and Pendula, with elongate decumbent stems and a lax habit, suitable for hanging baskets.

In this study, the single Pendula cultivar ('Rose Fountain') was tetraploid, while the Compacta cultivars ('Blue Moon', 'Blue Stone', 'Cambridge Blue', 'Paper Moon') were hexaploid. More extensive sampling will be required to determine if there is a correlation between ploidy level and growth form in this species. The earlier reports are not helpful in answering this question, because the cultivar or cultivar-group was not specified, or because the cultivars cited can not be equated confidently with modern cultivars. It is worth noting, however, that de Vilmorin and Simonet (1927) reported a hexaploid count for "var. *saphir pendula* hort.," which may refer to 'Sapphire', a cultivar of the Pendula Group.

TABLE 1. New reports of chromosome numbers in Campanulaceae.

Taxon	Voucher ^a	Locality ^b	<i>n</i>
<i>Campanula isophylla</i> Moretti cv. Stella White	8716	Cultivated	16 ^d
<i>Clermontia kakeana</i> Meyen	8128	O'ahu: Kamaile'unu Ridge, 775 m	14 ^d
<i>Cyanea hirtella</i> (H. Mann) Hillebrand	Wood 0903 (PTBG)	Kaua'i: Kalalau Rim, 1190 m	14 ^c
<i>Hippobroma longiflora</i> (L.) G. Don	8166	Kaua'i: 3 mi W of Hanalei, 20 m	14 ^d
<i>Lobelia erinus</i> L. cv. Blue Moon	8693	Cultivated	21 ^d
<i>Lobelia erinus</i> L. cv. Blue Stone	8692	Cultivated	21 ^d
<i>Lobelia erinus</i> L. cv. Cambridge Blue	8691	Cultivated	21 ^d
<i>Lobelia erinus</i> L. cv. Paper Moon	8694	Cultivated	21 ^d
<i>Lobelia erinus</i> L. cv. Rose Fountain	8584	Cultivated	14 ^d
<i>Trachelium coeruleum</i> L.	8713	Cultivated	17 ^d

^a Collection numbers without collector name or herbarium acronym were collected by Lammers and deposited at F.
^b "Cultivated" plants were grown from commercially obtained seeds in northeastern Illinois; the remaining localities are in the Hawaiian Islands.
^c First report for the species.
^d Confirms a previous report for the species.

The counts reported for the lobelioids *Clermontia kakeana* and *Hippobroma longiflora* confirm previously reported counts compiled by Lammers (1993). Similarly, the counts reported for the campanuloids *Campanula isophylla* and *Trachelium coeruleum* confirm previous reports of the same numbers. The former has been counted several times, most recently by Damboldt (1965); all reports show *n* = 16. The latter likewise has been counted several times, most recently by Contandriopoulos et al. (1984). Most of these reports show *n* = 17, though Contandriopoulos et al. (1984) found some plants with *n* = 16 in addition to 17-paired plants.

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